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Parallel submanifolds of the real 2-Grassmannian

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A submanifold of a Riemannian symmetric space is called parallel if its second fundamental form is a parallel section of the appropriate tensor bundle. We classify parallel submanifolds of the Grassmannian $\mathrm{Gr}^+_2(\mathbb{R}^{n+2})$ which parameterizes the oriented 2-planes of the Euclidean space \mathbb{R}^{n+2} ,. Our main result states that every complete parallel submanifold of $\mathrm{Gr}^+_2(\mathbb{R}^{n+2})$, which is not a curve, is contained in some totally geodesic submanifold as a symmetric submanifold. This result holds also if the ambient space is the non-compact dual of $\mathrm{Gr}^+_2(\mathbb{R}^{n+2})$,.

Comments: 41 pages. Submitted to Osaka Journal of Mathematics. This version contains a new result on the existence of parallel submanifolds with curvature isotropic tangent spaces. There were several mistakes in the proofs. An entry in the table of curvature invariant pairs was missing

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